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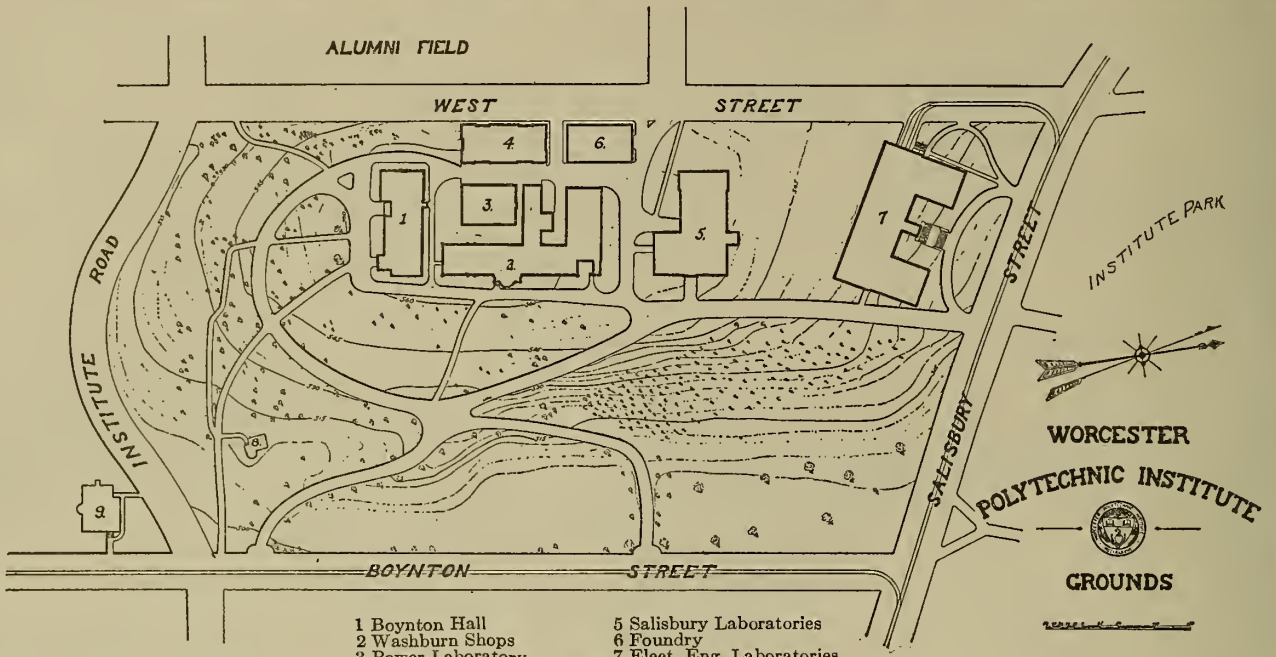
1909

# WORCESTER POLYTECHNIC INSTITUTE


ALUMNI FIELD
WEST
STREET
INSTITUTE ROAD
SALISBURY STREET
INSTITUTE PARK
BOYNTON STREET
WORCESTER
POLYTECHNIC INSTITUTE
GROUNDS
1 Boynton Hall
2 Washburn Shops
3 Power Laboratory
4 Engineering Laboratories
5 Salisbury Laboratories
6 Foundry
7 Elect. Eng. Laboratories
8 Magnetic Laboratory
9 President's Residence
1909

# Worcester Polytechnic Institute

## Worcester, Mass.

Published by the Institute
January, 1909

# WORCESTER POLYTECHNIC INSTITUTE

WORCESTER, MASSACHUSETTS.

EDMUND A. ENGLER, Ph. D., LL. D., President.

THE POWER LABORATORY

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ELECTRICAL ENGINEERING,
CIVIL ENGINEERING,
CHEMISTRY,
GENERAL SCIENCE,

leading to the degree of
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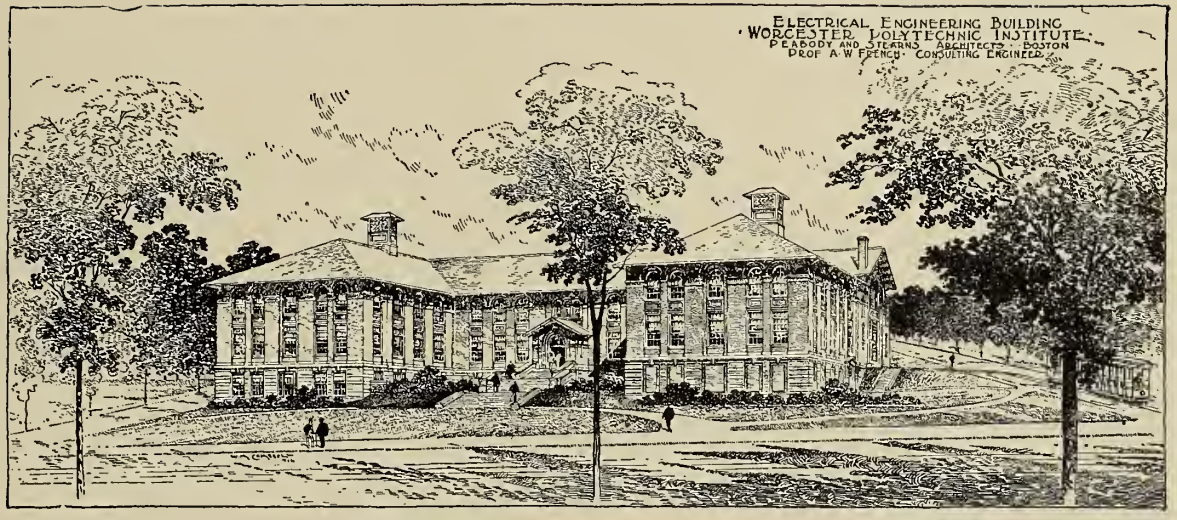
THE WORCESTER POLYTECHNIC INSTITUTE
1909

The Worcester Polytechnic Institute was founded in 1865 by a gift of $100,000 from John Boynton of Templeton, Mass. Further gifts by citizens of Worcester, supplemented by state donations, made possible the construction and equipment of its present nine buildings.

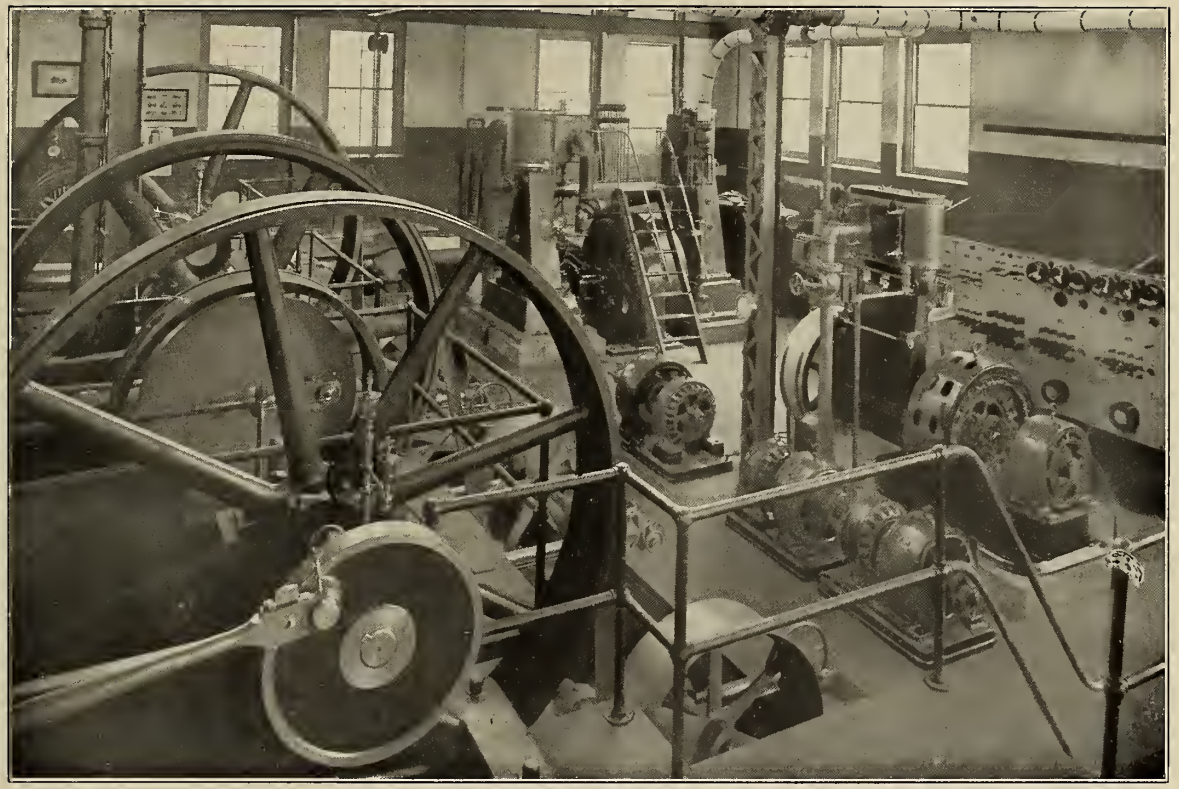
The Institute was opened for the reception of students in 1868, and the first class was graduated in 1871.

Worcester is a city of 140,000 inhabitants, an important centre of steam and electric railways. It contains extensive shops and manufactories and its industries are as diversified and as important as those of any city of its size in the world. Here are located the great wire mills of the Washburn and Moen Works of the American Steel and Wire Co., the shops of the Crompton-Knowles Loom Co., and many others hardly less important, all offering unusual opportunities for the investigation of practical manufacturing operations. The other great manufacturing centres of New England and New York are easily accessible. The location of the Institute, therefore, is especially favorable to the engineering student.




ELECTRICAL ENGINEERING BUILDING

The INSTITUTE occupies a tract of land about sixteen acres in extent, in the northwestern part of the city. The buildings are on a sightly elevation which slopes on the north to Institute Park, and which on the east and south overlooks much of the city proper. The buildings on this tract are eight in number, as follows: BOYNTON HALL, devoted to administration offices, the Library of General Reference, recitation rooms and the rooms of the Department of Civil Engineering; the WASHBURN SHOPS, including wood, machine and forge shops; the SALISBURY LABORATORIES, devoted to Chemistry and Physics; the ENGINEERING LABORATORY, occupied by the Departments of Drawing and of Mechanical Engineering; the POWER LABORATORY, where are installed the engines that furnish power to the Washburn Shops and the Mechanical Laboratory, and the dynamos that supply power to the Electrical Engineering Laboratory, and light and heat to most of the Institute buildings; the FOUNDRY; the MAGNETIC LABORATORY and the ELECTRICAL ENGINEERING BUILDING which is devoted to the work of the Department of Electrical Engineering. Besides these buildings the Institute has one dormitory, NEWTON HALL, a short distance away, on State Street, and a HYDRAULICS LABORATORY, situated at Chaffins, about five miles distant.

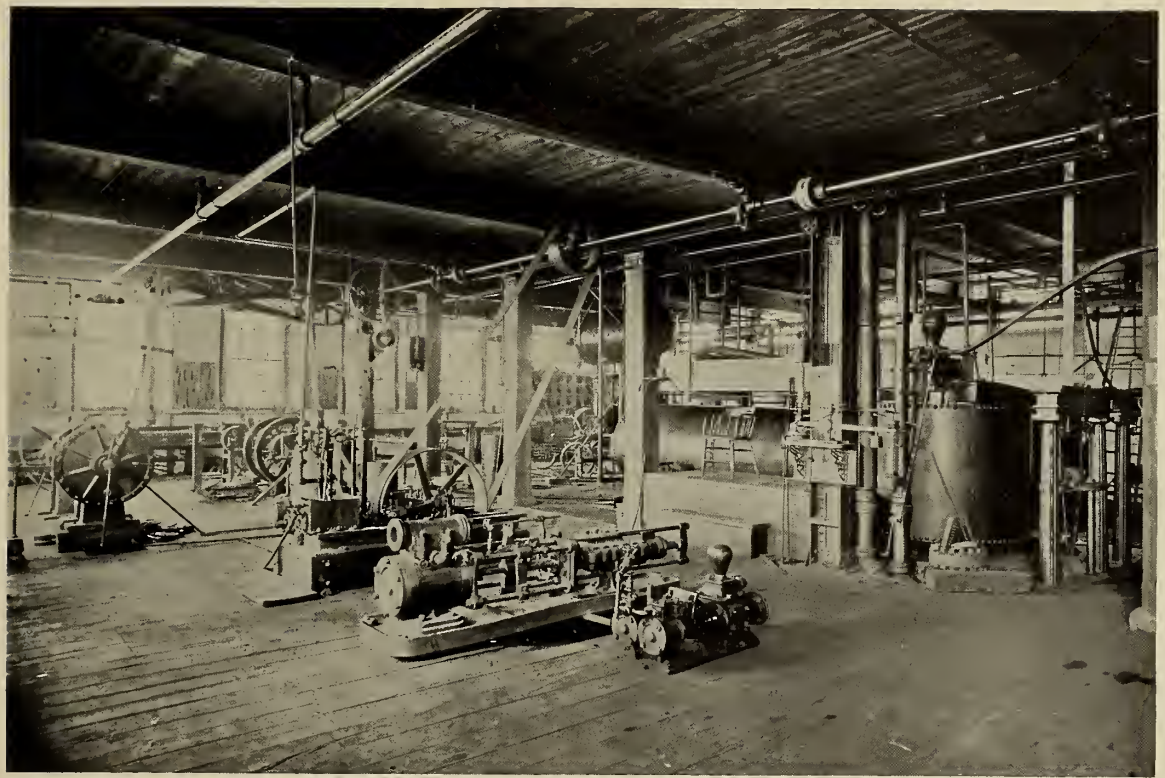


IN THE POWER LABORATORY

The Work of the Institute is carried on under the direction of a Faculty of nineteen professors, twenty-eight instructors, and numerous assistants in laboratories and workshops. Five courses of study are offered, each four years in length and each leading to the degree of Bachelor of Science. Graduate courses are provided, leading to the degree of Master of Science and Doctor of Science, and the professional degrees of Mechanical, Civil and Electrical Engineer are conferred upon properly qualified candidates. Students desiring to enter the Institute are examined in History, English, French or German, Spanish or Latin, Algebra, Plane and Solid Geometry and Chemistry or Physics. From certain accredited schools, a certificate is accepted in place of all examination.

The work in all courses is based upon a broad foundation of Mathematics, French or German, English, Chemistry, Drawing, Physics, Political Science and Civil Government. During Freshman year the studies are common to all courses. With the Sophomore year the special work of each course is emphasized.

A feature of all Institute courses is the importance attached to practical work in the workshops, and the large amount of laboratory practice, physical, chemical, electrical, mechanical and hydraulic required in all courses. Instruction is by means of text-books, lectures, with recitations, conferences and practical work in workshop and laboratory. Each course requires, as a condition of graduation, the preparation of a thesis, involving original research.



IN THE MECHANICAL ENGINEERING LABORATORIES

The Course in Mechanical Engineering offers instruction in the scientific principles underlying all engineering, but with particular emphasis laid upon those principles that relate to design, construction, and operation of machinery. The broad foundation supplied by the studies of Freshman and Sophomore years, prepares the student for the scientific and technical studies of Junior and Senior years. Throughout the course, the student devotes an average of twelve hours per week to shop practice, to the actual construction of machinery in the shops of the Institute. In the various laboratories, chemical, physical, mechanical, etc., he carries out experiments that both reveal and apply the natural laws of matter and energy, thus supplementing the theoretical instruction of the class-room. The studies of the Institute and the practice are further supplemented by frequent visits to the manufacturing establishments of Worcester and neighboring cities of New England.

MACHINE SHOP, WASHBURN SHOPS

The Courses in Civil Engineering, General and Sanitary, are designed to prepare the student in the *art* of engineering in such a way that he may be fitted upon graduation to be of value in the subordinate positions of the profession, and, further, to furnish him with such a grasp of the fundamental principles of the *science* of engineering, that he may, after acquiring experience, be fitted to design and direct important work.

To accomplish the first object an amount of practice in surveying, drawing and computation is provided, which may enable a faithful student to be a good surveyor, a neat draughtsman, and an accurate computer.

The broad general training common to all the courses, is followed by special instruction in strictly civil engineering subjects. The method of instruction employed is largely the study of text-books, supplemented by lectures and individual instruction in field and office work. A liberal use is made of current engineering literature and frequent visits are made to engineering works.

Students in the course in Sanitary Civil Engineering substitute during Junior and Senior years, work in Chemistry and Bacteriology for work in Railroad Engineering, Geology and Higher Structures.

A SUMMER SURVEYING CAMP

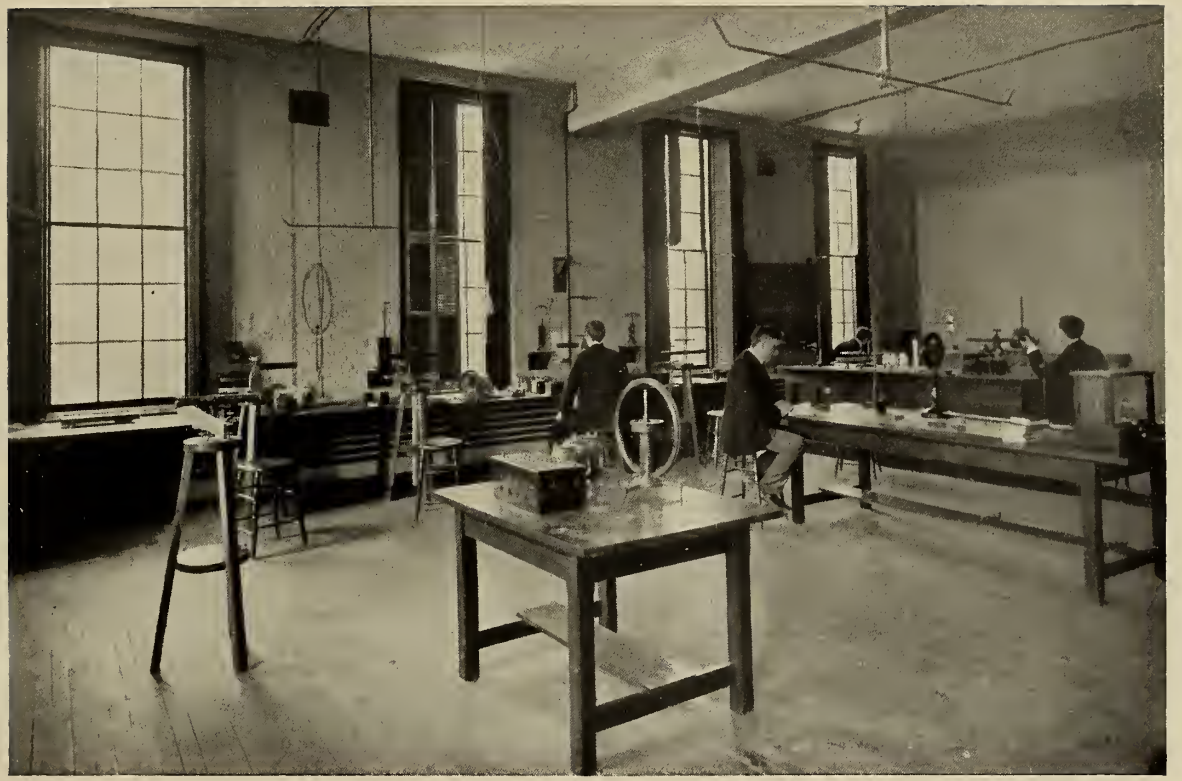
The COURSE IN CHEMISTRY is designed not only to prepare the student for actual work, as a practical chemist, but to give him the knowledge of theoretical chemistry which is absolutely essential to one whose aim is higher than that of a mere analyst. While it is absolutely necessary in technological training, that the student should make himself entirely familiar with the analysis of minerals, ores, iron, fuels, oils, gas, water and foods, it is also equally important that he should have a knowledge of the history and progress of the science, that he should understand the meaning of research work, and, by the study of American and foreign journals, obtain a knowledge of what is being done by others at the present time.

The COURSE IN CHEMISTRY includes the studies already mentioned as common to all courses. In addition, the Department of Chemistry is well equipped with laboratories to carry on its special work. These include a General, an Analytical, an Organic, an Industrial, a Sanitary and a Gas Laboratory and many rooms all well equipped for research work along particular lines.

IN THE LABORATORY OF INDUSTRIAL CHEMISTRY

The COURSE IN GENERAL SCIENCE is intended to meet the needs of young men who expect to take non-technical positions in commerce and manufacturing, to become teachers, or to enter upon professional study later. To such students with more general needs, it opens a broader range of study than is possible in the more technical courses, which train engineers and chemists.

The COURSE IN GENERAL SCIENCE is no less exacting in quantity or quality of work required of its students, but a certain amount of elective work is allowed, as the student's individual purposes and aptitudes make this available. These electives are chosen from the regular work of the various courses, with especial options offered in History, Political Science, Economics and Physics. To the end of the first half of Sophomore year the COURSE IN GENERAL SCIENCE is identical with that in Chemistry. Beyond that point students in the COURSE IN GENERAL SCIENCE are required to take all work common to all the other courses, the remainder of the schedule to be filled in conference with the President of the Institute.

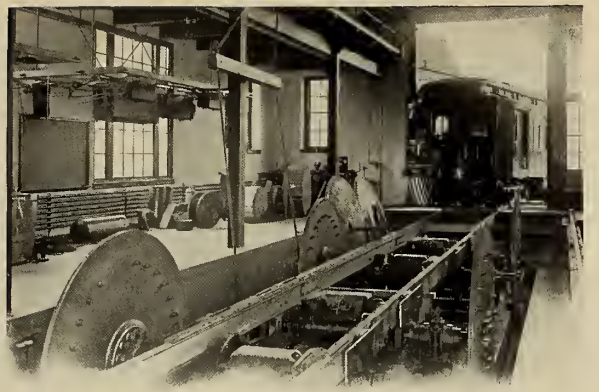


IN THE PHYSICS LABORATORIES

The COURSE IN ELECTRICAL ENGINEERING is designed to provide a young man intending to take up practical and professional engineering work in connection with the various electrical industries, with a theoretical and practical training which will enable him to enter upon such duties understandingly and with a good foundation for his life work as an engineer.

Those studies previously mentioned as common to all courses, form the foundation in the COURSE IN ELECTRICAL ENGINEERING. In addition emphasis is laid on the study of subjects especially necessary to the electrical engineer, while the course includes nearly all the subjects required for Mechanical Engineering. During the last year certain electives are offered. In the Senior and Graduate years there are extended courses on the theory and application of electricity, in laboratory work and electrical design and in related subjects.

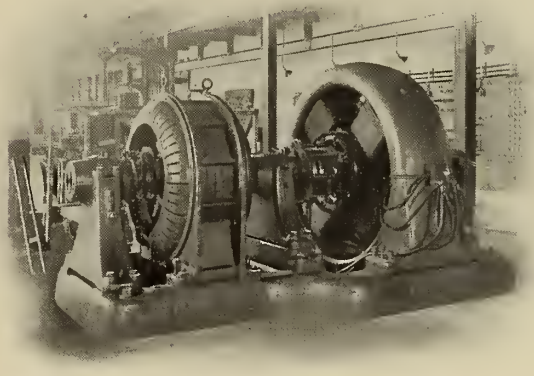
Visits of inspection are made each year to important installations, and frequent addresses are given by alumni and other practising engineers, before the students of the course.



CAR TESTING STAND

W. P. I. TEST CAR ON TESTING STAND

ELECTRICAL ENGINEERING DESIGN ROOM



300 H. P. MOTOR-GENERATOR

The Salisbury Laboratories, erected in 1888, are devoted to the work in Chemistry and Physics.

The Department of Chemistry occupies over 20,000 square feet of floor space. Its various laboratories include a General, an Analytical, an Organic, an Industrial, a Sanitary, a Bacteriological, an Electrolytic and a Gas Analysis Laboratory, all thoroughly equipped with permanent fittings and apparatus for carrying on the work of the Department.

The Department of Physics occupies, besides lecture and recitation rooms and offices, laboratories for work in Elementary Mechanics, Electricity, Heat and Physical Chemistry, Magnetism and other special laboratories, also a spectrometer room, a photographic room, a photometric room and other rooms for constant temperature, for storage battery, apparatus and storage. The equipment of the Department is that suitable to a first-class engineering and science college.

The Electrical Engineering Building, opened in the fall of 1907, is devoted to the work in Electrical Engineering. It has a total floor space of 48,000 square feet and contains a general laboratory, smaller laboratories for special work, offices, a Department Library with capacity for over 3,000 volumes, smaller rooms for storage batteries, etc., lecture and recitation rooms, drawing and design rooms. The building is served with a 10-ton electric travelling crane and smaller trolley hoists.

The equipment includes a large variety of dynamos, motors, testing and calibrating instruments, various kinds of apparatus for power and light, all connected by a complete system of wires and switchboards; also a complete double truck, four-motor interurban car, equipped with the latest style of motors, controlling and braking apparatus, and a very complete set of recording instruments that will measure the power consumption, speed, traction effort, etc., of the car under test. This car may be run upon the rails of the local system and sent to any part of the country for testing work.

GENERAL LABORATORY, ELECTRICAL ENGINEERING BUILDING

The ENGINEERING LABORATORY is occupied by the Departments of Drawing and Machine Design, Mechanical Engineering and Steam and Hydraulic Engineering.

The Mechanical Engineering Laboratory is equipped with testing apparatus in great variety, including torsion, tension and compression, a cement-testing machine, a belt-tester and various pieces of minor apparatus such as extensometers, dynamometers, etc. For studying purely steam phenomena the Laboratory has calorimeters of various types, indicator and gauge testing apparatus, condenser and air-pump gauges, thermometers, etc.

In the POWER LABORATORY are installed three large steam-engines, for experimental purposes, the regular service plant consisting of three directly connected engines, and a gas-engine. They supply power to the Washburn Shops and the Mechanical Engineering Laboratory. Four boilers, aggregating 600-horse power, are installed, furnishing steam to engines and for any experiments, and supplying heat to the entire Institute.

In the POWER LABORATORY are located the heavy dynamos of the Department of Electrical Engineering, which furnish power to the Laboratory of that Department and light to the buildings of the Institute; also a complete refrigerating plant of one-half ton capacity.

The HYDRAULICS LABORATORY is at Chaffins, a station on the Boston and Maine R. R., about five miles from the Institute, which here owns a water privilege of 80-horse power. For experimental purposes there is an 80-horse power Hercules waterwheel, with full equipment of meters, weirs, piezometers, etc., for registering flow, velocity and pressure.

Smaller hydraulic apparatus is installed in the Engineering Laboratory. It consists of pumps, orifice tanks, meters, hydraulic ram, etc.

IN THE FORGE ROOM

The WASHBURN SHOPS buildings consist of a three-story central structure with several extensions, and a Foundry. The shops contain rooms for wood work, machine work, forge work, draughting and designing, tool rooms, and painting and finishing rooms, offices, etc., in all comprising more than an acre of floor-space.

The Woodworking Department is equipped with thirty-six benches, each supplied with hand tools. A full equipment of the latest forms of machine-tools is available, comprising planers, saws, mortising-machines, etc.

In the machine room are lathes, planers, shapers, milling-machines, drills, gear cutters, etc., and a full supply of standard gauges, threads and measures.

In the Forge-Shop are twenty-six forges of the down-draft type and heavy vises, shears, swedge-blocks, etc., for use in common.

The Foundry, erected in 1902, is equipped with two cupola furnaces, two crucible furnaces, cranes, hydraulic elevator, core ovens, pickling vats, and rattlers. It is complete in every respect. The Washburn Shops, besides furnishing the students of the Institute with practical work, are conducted as a business enterprise engaged in the manufacture of standard machine-tools on a commercial basis, and giving employment in wood and machine shop, in forge and foundry, to a large number of skilled workmen.

MADE IN THE WASHBURN SHOPS

The EXPENSES OF A STUDENT at the Worcester Polytechnic Institute seldom exceed $450 a year, and are generally much less. Tuition, including laboratory fees, is $160 a year. The expenses for books, supplies and drawing instruments will average $25 a year. Good board can be secured in the vicinity of the Institute at from $3.50 to $4.50 a week, and rooms with light and heat will cost from $40 to $60 a year.

The Institute has one Dormitory and Dining-room, NEWTON HALL. In this Dormitory about thirty students find rooms, and about sixty can be accommodated with board. The price of rooms ranges from $40 to $70 a year. The price of board is $3.75 a week.

There are about thirty scholarships, granting free tuition to the holder, available for residents of Worcester County, and forty additional scholarships for residents of the State of Massachusetts.

THE PRESIDENT'S HOUSE

NEWTON HALL

PHI GAMMA DELTA HOUSE

SIGMA ALPHA EPSILON HOUSE

The Library of General Reference of the Institute is in Boynton Hall. There are, besides, department libraries in the several buildings where the principal work of the departments is carried on.

The Worcester Free Public Library of 168,000 volumes and the library of the American Antiquarian Society of 120,000 volumes, are available for students of the Institute.

Football, baseball, basketball, track athletics and tennis are encouraged within proper limits, the management of the various branches of athletic sport being in the hands of the students, acting with an advisory board of the Faculty. A cinder track and space for field athletics, football and baseball practice, and tennis, are available on the Institute grounds, and on Alumni Field which lies across West Street from the Institute.

Student societies have been organized to discuss technical and scientific subjects and to hear addresses from alumni and other specialists on topics of engineering interest. These societies include a Mechanical Engineering, a Civil Engineering, a Chemical and an Electrical Engineering Society.

The Journal of the Institute appears bi-monthly and is an exponent of the activities of students, alumni and Faculty. It is issued under the direction of a student board of editors, acting with an advisory board of Faculty and alumni.

THE MAGNETIC LABORATORY

THE FOUNDRY

THE HYDRAULICS LABORATORY AT CHAFFINS

The ALUMNI of the Institute now number 1,189. Since the Institute was opened in 1868, there have been admitted 2,497 students, of whom 1,272 graduated. Eighty-three have died among these graduates, leaving at the present time 1,189 living graduates. Of these over ninety per cent. are engaged in work for which their training at the Institute actually fitted them.

Among the earlier classes are to be found superintendents, managers, partners and proprietors of almost every variety of manufacturing industry. Many are chief engineers, chief draughtsmen and designers. More than a score are practising lawyers, chiefly patent lawyers, and almost without exception these have served as Examiners in the United States Patent Office where there are always representatives of the Institute alumni.

The more recent graduates begin their life work as foremen, draughtsmen, inspectors and assistants in office, shop, field and laboratory. Many in recent years have entered the profession of teaching along the line of drawing, mathematics, sciences, and mechanical or electrical engineering, and are now filling important positions in high schools, normal schools and universities. The demand for graduates of the Institute is constant and at times is far in excess of the available supply.

IN THE FOUNDRY

WORCESTER POLYTECHNIC INSTITUTE
1871

LIBRARY OF CONGRESS
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